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ASSESSMENT OF AIRPORT PERFORMANCE IN INDIA

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ABSTRACT

Since the advent of privatisation and deregulation in the 1990's, the Indian aviation industry has been perceived as a lucrative market in the Asian region. Recognising the sheer potential in improving the airport facilities, the Indian aviation industry underwent a major overhaul through policy changes and liberalisation of air transport services. Despite such various initiatives for upgrading airport infrastructure, the Indian airports are still considered inadequate to handle the upsurge in air traffic and suffer from cost inefficiencies. This paper is an investigation aimed at establishing the key performance measures that airports in the Indian context should use to evaluate performance. It measures and compares the performance levels of five newly privatised international airports in India while addressing several critical areas of activity such as operations, economics, customer service, environmental issues, and safety and security. The research heavily relies on the use of benchmarking to make the comparatives across this representative sample of airports and serves as a framework for the development of Key Performance Indicators. For this purpose, the paper identifies and confirms a list of performance measures relevant to the Indian conditions that emerged from surveying airport professionals associated with best practice in the global aviation industry. The research seeks to foster the expansion of the Indian airport market by developing an efficient performance management framework that could be used by Indian airport managers to validate the operational performance of their airports by comparing them to other award winning global terminals. The paper also begins to develop a database of performance measures and generates a reference for airport infrastructure assessment in developing countries.

Keywords: airport management, aviation industry, best practice benchmarking, performance measurement, public-private partnership, India

INTRODUCTION

With the introduction of Public-Private Partnerships for Indian infrastructure, the fledgling local aviation industry has taken wings with an ambitious plan. The Indian Government eventually recognised the significance of making air travel services accessible to the wider population and deployed several incentives to mobilise capital for upgrading airport facilities across the country along with the liberalisation of air transport services (Ohri, 2012). An estimated £30 billion of investment is expected to be delivered in the form of 20 green-field airports by the end of 2020 to serve the

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predicted 300 million passengers (Cho and Lewis, 2011). Unfortunately, in India there has been no clearly defined model or research to aid the design process of terminals that can satisfy the ever-increasing local appetite for commercial aviation. This lack of adequate information necessary for an efficient terminal design as well as scarce high quality air transport services, have made it difficult for international tourism to keep pace with the global rates of increase (Raguraman, 1998). Furthermore, design parameters conceived and used in the developed countries are being implemented in the developing country context without appropriate analysis of its financial and operational implications (Ohri, 2012).

In a globalised sense, airports are a gateway to an entire nation, while in a simpler yet equally important sense, they are highly complex parking lots regarded as indicators of local economic growth. With the rise in commercialisation and privatisation of airports, it is of paramount importance to continuously monitor their productive efficiency, operating profits, and overall performance in the most methodical manner (Gillen and Lall, 1997; Oum and Yu, 2004). Observing the diverse challenges affecting the Indian aviation industry such as change in ownership patterns, increased focus on commercial aspects and a rapid passenger growth along with accelerated innovation in technologies, there is a significant need for performance management and improvement. Enoma and Allen (2007) state that to ensure a continuous growth and success of an industry, an observant consideration of its performance levels and their measurement becomes vital. However, airports being business units predominantly engaged in service provision, there is a general dearth of relevant market measures for performance. This is even more pronounced in India, as airport services are not considered to be a part of a 'traditional' economic market.

Many Indian airports undertake performance measurement only in terms of accounting and overlook measures of productivity. Given the unique characteristics of an airport and the current consolidation of the air carrier industry in India, using financial indicators is an insufficient and also misleading method to define the quality of service and management performance (Gillen and Lall, 1997). The problem is further exacerbated by the regulatory, geographic, economical, social, and political constraints that vary with state borders, making direct comparisons between different airports a difficult undertaking. As a result, the contextual environments within which Indian airports operate are exempt from the market forces that ensure optimal performance.

Aims, Objectives and Study Approach

The privatisation initiative of the 1990's was to ensure an unceasing rise in efficiency levels for the airport infrastructure and in turn boost regional development (Tsekeris, 2011). However, the unprecedented change expected in the Indian aviation gradually dissipated due to lack of regulatory framework, insufficient understanding of changing market structures, and lack of competition in addition to complicated concessions and unrealistic demands by project-affected people (Patel and Bhattacharya, 2010). As a result, India missed the chance to be the international connecting hub in Asia. Presently, the rapid passenger growth and the entry of Low Cost Carriers (LCC) has once again prompted the international airports in India to join the league of major financial and economic centres in Asia as significant regional hubs. This is a plausible scenario if the airports are developed intelligently, with the provision of adequate capacity to meet short and long-term demand (Raghunath, 2014). For such a sustainable development, it is essential for the airports to be aware of the best practices across the aviation industry. Measuring and comparing airport performance is of paramount importance not only for improving processes but also for attracting a large

passenger and freight base (Civil Aviation Authority, 2002). A meaningful way to evaluate and compare airport performance would be through understanding observable and measurable differences showcased by airport characteristics and the level of efficiency in their operations. This can be achieved through the way of benchmarking, an indispensable strategic planning tool, which enables continuous improvement in the performance of a company (Chen, 2002). The visible difference in the airport performance can be effectively studied through the relationship between airport characteristics, operations and their respective performance measures. Thus, the basic aim of this paper is to foster the expansion of the Indian airport market by developing an efficient performance management framework.

In light of the above, the first objective of this paper is to construct an effective database of performance measures adopted from OPAL (2003) and use benchmarking measures to compare the performance of airport operations for the Indian aviation industry. Based on this database, the second objective is to validate a performance measurement framework better suited to the Indian context, which will aim to increase the efficiency and effectiveness of the airport capacity by addressing terminal dynamics.

The paper primarily measures and compares the performance levels of five international airports in India while addressing several critical areas of activity. It presents a list of key performance measures relevant to the Indian conditions that have emerged from surveying airport professionals from the best practice in the UK and Indian aviation industry. The research heavily relies on benchmarking to draw comparatives across the representative sample of the five airports and hopes to contribute towards the development of Key Performance Indicators (KPI).

CONTEXT

A number of performance measures and methodologies have been devised with a great emphasis on airside alone owing to the complex nature of airports. The diverse regulatory and operating structures, varied ownership patterns, and distinct services offered along with extraneous characteristics such as location and environmental factors are responsible for the complexity and heterogeneous nature of airports. However, with increasing passenger demands and expansion capacities, there is a need for systemic assessment of investment and operating strategies of this elaborate infrastructure in a holistic manner (Lemer, 1992).

Facility management is the key to improving performance of airport facilities and thus, it is necessary to establish and test a range of potential performance measures for total efficiency (Enoma and Allen, 2007). There has been ample evidence in the literature of evaluating the performance of isolated elements of airport terminals, each characterized by a different transient pattern (Jim and Chang, 1998). Such narrowly focused studies not only lead to biased empirical results but also are unable to accurately account for the means of output and input. A critical analysis of the performance measurement models in use and their relevance to Indian conditions would be beneficial. This would enable effective strategic decision-making and provide a suitable method of measuring airport performance to best suit local needs and context (Manataki and Zografos, 2010).

For the purpose of this paper, the interrelated concepts of performance measurement, such as benchmarking, and best practice marking will be used to compare and assess the performance of airports in India. As performance measurement has the potential to

compare equivalents, it ensures comparability between different airports as well as facilities for the same airport as time goes by (Enoma and Allen, 2007). To avoid misinterpretations and exploit the full potential of the use of performance measurement, a careful interpretation of the performance measures has been undertaken under the guidance of people, who have an extensive knowledge of performance measurement (Adler et al, 2009; Civil Aviation Authority, 2002). Thus in this paper, performance measures approved by the airport professionals engaged in international Best Practices will be used to compare and assess the performance of airports in India.

India-specific studies

The achievements secured in the Indian aviation sector seem modest, when compared to its Asian peers during the time period. A strong preference for retention of control has made the Indian government lose out on the benefits of privatisation such as efficiency, resource development and competitive environments (Hooper, 2002; Patel and Bhattacharya, 2010; Ohri, 2012). Even though a major initiative in airport infrastructure was feasible given the gamut of policy changes witnessed, the political commitment required to sustain the momentum of reform in aviation industry dwindled (Patel and Bhattacharya, 2010). The constant delays in sanctioning new privatised projects have been responsible for long lead times causing these highly anticipated projects to fall by the wayside. The efforts to speed up and streamline the infrastructure developments have not been implemented, setting in a fatigue factor (Centre for Aviation, 2015). Owing to this, the number of studies in the Indian aviation sector consequently diminished creating a gap in the body of knowledge (Patel and Bhattacharya, 2010), (Ohri, 2012). To date, there has been no comprehensive research in the Indian context assessing the efficiency and performance levels of operations for the representative cases of international Indian airports. Thus, there is a great need to investigate airports developed under public-private partnership models in order to understand ownership effects on the performance of the terminal and in its productive efficiency.

RESEARCH METHDOLOGY

The undertaken research essentially investigates if the findings of previous research methodologies can be extended to the Indian context and is largely empirically focused. It is based on the analysis of information obtained through the use of survey questionnaires and phone interviews undertaken in two phases, as explained in the following. It is important to note that the paper does not attempt to propose a methodological innovation. Instead it makes use of proven methodologies to work out efficiencies based on a unique collection of data derived from previous studies.

Data Collection

Phase 1 Professionals engaged in the management of “best practice” airports such as Heathrow, Gatwick and OR Tambo were requested to fill out a questionnaire and assign weights to performance measures of several airport activity areas. The intent behind the selection of these airports was their similar ownership models (i.e. private via some form of PPP), as well as their global recognition for development and application of best practices. 11 officials were interviewed and the response rate was a 100 per cent with each survey session limited to an approximate 10-15 minutes. All data was collected under conditions of anonymity.

Phase 2 Managers of various airport authorities of India were invited to be a part of a second survey under conditions of strict anonymity. They were requested to appraise the performance of five Indian international airports against the performance measures ranked in Phase I of the study. Two officials from each of the 9 departments of the public body – Airport Authority of India (AAI) – were selected for the study. The response rate was 94.4% as one of the officials was absent on the day of the survey.

Airport Selection and Performance Measurement

The selection of Indian airports was based mostly on their governance structure, which is private ownership and operation. According to Oum and Yu (2004), the level of involvement of the operator as well as the scale of the airport critically influences its revenue and performance. Thus, the representative sample selected for assessment and comparison in this study is varying in passenger movements, size, and location but has the same governance structure. While there have been several studies investigating the effects of privatisation in the airport industry, only a limited number of them have attempted to analyse the corresponding change (if applicable) in performance levels (Fasone et al, 2014). This paper concentrates on airports developed under Public-Private Partnership models in order to understand ownership effects on the performance of the terminal in its productive efficiency. Such a restricted sample of airports enables easy procurement of data and helps secure sufficient access to information. The airports chosen for the survey and some of their basic characteristics have been listed in Table 1.

TABLE 1 Airports used for Assessment

Airport	IATA code	Location	Terminal Area Size	Passenger Flows
Chhatrapati Shivaji International Airport	BOM	Mumbai, Maharashtra	450,000 m^2	32,221,395
Indira Gandhi International Airport (DEL)	DEL	New Delhi, Delhi	502,000 m^2	36,876,986
Rajiv Gandhi International Airport (HYD)	HYD	Hyderabad, Telangana	105,300 m^2	8,653,784
Kempegowda International Airport (BLR)	BLR	Bengaluru, Karnataka	170,000 m^2	12,868,830
Cochin International Airport	COK	Kochi, Kerala	140,000 m^2	12,383,114

The managers of AAI appraised these private airports against the performance measures ranked in Phase I of the study. A biased benchmarking process harbours the eminent danger of evaluating airport performance incorrectly and blaming exogenous factors for inefficient operations (Reinhold et al, 2010). Thus, the usage of public body officials to assess the privately operated airports has helped reduce the bias of evaluation and identify reasons for inefficiencies accurately.

The objective for Phase 1 of the study was to compare and evaluate against Best Practices in the airport industry. Hence, expert professionals involved in the management of Heathrow, Gatwick and OR Tambo were invited to participate. The activity areas of interest are presented in Figure 1.

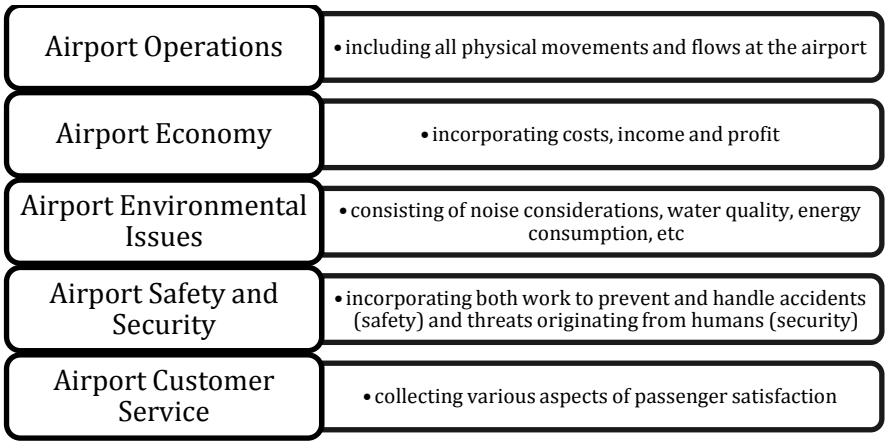

FIGURE 1 Activity Areas and scope of their performance measures

The set of performance measures were carefully identified within each area to avoid cumbersome performance evaluation for the second phase of the survey.

Survey development

For identification and rating of main quality measures amongst the Best Practices, and analysis and appraisal of services in the Indian context, the survey instruments were developed on the basis of the Likert scale. The advantage of Likert scale is that the respondent is not pressured into giving a concrete reply. It enables participants to respond in degrees of agreement besides providing the alternative of being neutral or indifferent, making it easier for the respondent. (LaMarca, 2014).

In the first phase, the performance measures within the areas of activity were weighted with 1, 3 and 5, with 1 being the "least important", 3 being "important" and 5 being the "most important" for pilot survey (performance measurement). For the second phase, the narrowed down measures were appraised in a higher level of detail in terms of the following categories: Poor, Bad, Average, Good and Excellent. Each of the category was assigned a weight, Poor = 1 and Excellent = 5. In the airport performance measurement, airport managers assessed six areas of activities and their corresponding measures.

Data Collection Results

Phase I The respondents of the first survey helped identify and rank a set of significant performance measures necessary for thorough monitoring, comparison and development of any airport in the activity areas of Airport Operations, Airport Economics, Airport Environmental Issues, Airport Safety and Security and Airport Customer Service.

Phase II Based on Phase I, performance data for key indicators on Indian airports was gathered with the help of Indian airport authorities as listed in Table 2. Aggregate values per Activity Area were determined by using the weights obtained from Phase I.

TABLE 2 Compilation of Indian Airports evaluated on Performance Measures

Key Performance Indicators	BOM	DEL	HYD	BLR	COK
Airport Operations					
Turnaround times in the gate area	4.36	4.89	4.15	4.45	4.05
Arrival Inbound Efficiency	4.28	4.53	3.89	4.13	3.94
Departure Outbound Efficiency	4.25	4.79	3.86	4.38	3.97
Temporal distribution of demand by time of day	3.40	3.82	3.41	3.86	3.36
Total traffic in terms of aircraft movement	4.01	3.75	3.76	3.65	3.52
Runway occupancy times by type of aircraft	3.68	4.45	3.12	3.60	4.01
Taxiing times from runways to gates/apron and vice-versa	3.82	3.43	3.88	4.07	3.97

Baggage delivery time	4.56	4.68	3.96	4.29	4.15
Number of runways and taxiways simultaneously in use.	3.85	4.12	3.24	3.91	3.24
Airport Economics					
Income per passenger	4.65	4.31	3.98	4.24	3.49
Traffic income per passenger	4.03	4.24	3.50	4.13	3.85
Non-aeronautical income per passenger	3.42	3.35	3.86	3.25	3.01
Staff cost per passenger	4.56	4.27	3.95	4.05	3.92
Revenue per expenditure ratio	4.35	4.16	3.14	3.99	4.24
Commercial income per square meter of floor space	4.68	4.47	4.56	4.01	3.93
Expenditure per passenger	4.46	4.80	4.33	4.62	3.78
Contribution per WLU	4.15	4.56	4.38	4.14	4.11
Airport Environmental Issues					
Energy Consumption	4.53	4.91	4.10	4.23	3.68
Number of contamination events	4.36	4.57	4.21	4.09	3.96
Waste recycling	3.87	3.61	3.86	3.30	3.92
Area affected by aircraft noise	4.14	3.95	4.02	4.36	4.11
Number of breaches of noise limits	4.42	4.18	3.91	4.16	3.83
Share of journeys that use public transport	3.46	3.49	3.81	3.84	3.41
Energy Consumption	4.23	4.57	4.11	4.25	4.08
Number of contamination events	4.19	4.23	4.03	4.43	4.14
Airport Safety and Security					
Number of aircraft safety incidents	4.45	4.67	4.17	4.09	4.23
Number of incidents at security checkpoints	4.40	4.92	3.79	4.44	3.67
Time between shut-down & reopening in case of breach of security	4.27	4.33	4.02	4.27	4.17
Time it takes for business operations to begin in case of evacuation	4.38	4.15	3.82	4.11	4.24
Taken time and grade of destruction when returning to normalcy	4.00	3.76	3.88	3.99	3.96
Airport Customer Service					
Check-in waiting and processing times	4.94	4.87	4.07	4.16	3.93
Security control waiting and processing times	4.86	4.53	4.12	4.39	3.89
Frequency and duration of delays	4.65	4.31	3.65	4.15	4.03
Quality of signage/ease to find the way	4.47	4.16	4.24	4.54	4.14
Baggage waiting time	3.46	3.85	3.19	3.93	3.80

Figure 2 shows the classification of the frequency of occurrence of responses on the perceived quality of services for the airports considered in this study.

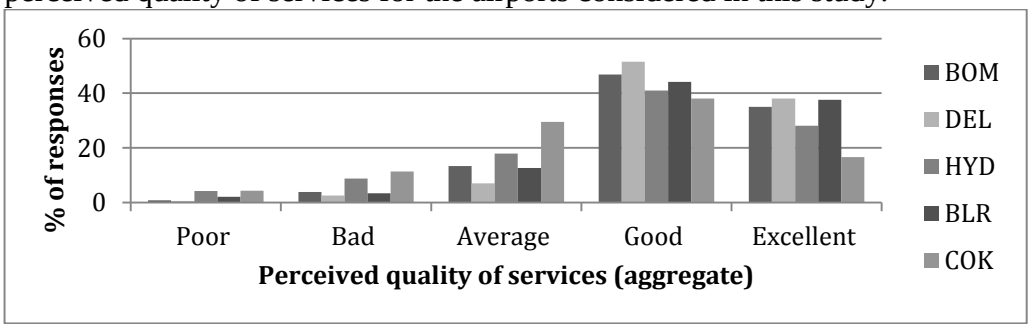

FIGURE 2 Classification of the frequency of occurrence of responses on perceived quality of services by airport.

BOM shows the second highest occurrence factors ranked as Good - 4 whereas DEL is observed to show the largest occurrence of Good - 4 and Excellent - 5 factors. The unfavourable indices are seen to be remarkably high in HYD and COK.

In order to rank the five Indian airports of the study a composite performance index was constructed. The index is estimated as the weighted average of the performance scores of the five activity areas as follows:

$$\text{Composite Performance Index} = \frac{\text{Average weighted rating} * \text{Sum of the Concepts}}{\text{Number of Concepts}} \quad (1)$$

The values of the composite index describing the overall performance of the airport sample used in this study are as follows: BOM – 8.42, DEL – 8.54, HYD – 7.76, BLR – 8.20, COK – 7.74. Thus, it is clear that DEL has emerged as the best contender offering the best operational performance from Indian airport authority point of view.

MAIN DISCUSSION AND ANALYSIS

The survey results of Phase I of the study on airport performance measurement have identified and validated a final set of significant performance measures from an initial set gathered through existing literature. These handpicked performance measures are observed to be manageable and covering performance attributes of the whole airport. They are easy to comprehend and can help highlight areas or processes performing below the level of desired standard. Thus, these highly ranked performance measures enable rapid monitoring of information for better comparison with other airports as well as guide their development over time. All the areas of activity have generally 2-3 measures of higher significance except Airport Operations, which has 5 indicating the intricacy involved in its activities.

The compilation of performance measures listed in Figure 2 gives a clear insight to the current productivities of the five Indian airports, under consideration. Most of the Indian airports are seen to be performing fairly well in the categories that are seen as a requisite to be 'best in class' terminals. The high levels of performance levels show compliance with Best Practice standards. The responses indicate that the private operators have a uniform perception of performance levels, which could be attributed to corporatisation and commercial approach of management.

As the set of indicators comprehensively address all activity areas of the five airports, the results can be used to gauge the organisation's performance level. Similarly, the relative performance can be used to aid in establishing standards. Thus, the technique of benchmarking helped to test the measures operationally for relative comparisons and validate their usefulness in achieving continuous development. The performance level of BOM airport for 'income per passenger' is high at 4.65 whereas COK demonstrates a low performance level of 3.49. Thus, the BOM airport operators have established a standard for the COK airport to achieve and the COK airport operators in turn, would bring about a development by attempting to reach the set standard.

With the help of benchmarking, the assessment and comparison of the five airports gives the managers an idea of the areas where performance needs to be improved besides the performance measures of Best Practice, such as:

- 'temporal distribution of demand by time of day' in the operations category,
- 'non-aeronautical income per passenger' in the economics category,
- 'waste recycling' and 'share of journeys that use public transport' in the environmental issues category,
- 'taken time and grade of destruction when returning to normalcy' in the safety and security category,
- 'baggage waiting time' in the customer service category.

One could mistake the low performance observed in these categories as a generic definition of adequate performance across the aviation industry, because of the concordant figures. The paper consciously avoids direct comparison with Best Practice and steers clear from imitating the framework followed by them. Instead, it aims to assimilate the essence and identify characteristics that make such practices exemplary. It is also important to highlight that the study does not establish quantifiable performance measures based on airports worldwide; hence the performance evaluation

is only against other Indian airports, which may be generally performing exceedingly well or poorly.

Survey results can be used to prioritise these indicators in addition to the validated set of performance measures and inform the allocation of resources for enhanced overall efficiency. This is important from the point of view of achieving comprehensive productivity as it informs the managers about the areas in which the airport is lacking. For example, 'waste recycling' is not listed as a significant performance measure in the pilot survey, but the average performance level across the five airports offers enough proof to demand attention from managers and bring about a total improvement. Thus, the managers of the five airports can prioritise and employ resources for better waste recycling and appraise the standards of efficiency with respect to environmental issues. It is likely that every performance measure has a varying impact on the individual airport functions, as well as the overall airport efficiency. There is constant need to identify such laggard indicators to achieve a competitive advantage. This helps predict and mitigate the diverse challenges associated with them in the dynamic context of aviation industry. Thus, benchmarking is useful not only for establishing standards, but also for identifying shortcomings in industry practices as observed in the literature review. However, care should be taken to ensure that experts with extensive knowledge of performance measures and aviation industry supervise these suggestions for improvement. If this is not properly done, the indicators may be of limited use and subject to misinterpretations (Adler et al, 2009).

It is also important to note that although benchmarking has helped specifying improvement areas, it does not inform how to bring about the necessary improvements nor provides the underlying cause. Thus, it is crucial that managers lay equal emphasis on understanding the underlying processes responsible for the deviation of performance than merely focus on the results of performance measures (Holloway et al, 1999). Concentrating on process improvement and understanding the reasons for variance in performance will further benefit the practitioners of benchmarking (Francis et al, 2002). The procedure can be strengthened through the united efforts of airport operators and information sharing. The problems faced by these hubs in the Indian state are similar to a great degree. Cox and Thompson (1998) regard such divulgence of sensitive information as a disadvantage. However, forging relationships to gather comparable data and exploiting inter-airport learning would serve as an important source of competitive advantage. This continual refinement in the body of knowledge would let the entire aviation industry thrive.

Also, despite the same structure of governance and similar sizes, the five airports show significant differences in their composite indices of operational performance. This contradicts Oum and Yu (2004), as they are of the opinion that operational performance correlates to governance structure and size of airport rather than hub, location and economic growth of the region. A review of the five airports based on the above-mentioned categories is perhaps a logical extension to this survey.

In a nutshell, the survey analysis has provided some interesting and useful insights deserving greater attention. First, operational performance is influenced more by location, economic growth of a region, and existence of a hub than the form of ownership and size. Second, the managerial practice of the aviation industry is in constant need of a robust and versatile performance measuring system due to the interactive, iterative and complex nature of the infrastructure. Third, despite being grouped by ownership status, the performance levels vary vastly across airports due to variations in exogenous factors such as location and economic growth of the region.

At the same time the work undertaken in this paper is not free of its own limitations. The approved set of performance measures enables a rapid means of processing and monitoring information across the five airports. It also facilitates easy comparison to set standards and indicate areas, which need improvisation. While the usefulness of these approved measures has been validated through the survey results, it should be noted that restricting comparisons to the final set would hinder further growth of the industry. The approved set was rated from a pre-selected group suggested in the literature and were considered as the least bad alternatives. Moreover, one cannot overlook a certain bias of human perception in such surveys despite the care taken to keep it to a bare minimum. To sustain development in the dynamic context of aviation industry, these measures would need continuous refinement and testing.

The results can be analysed in several ways depending on the attitude of the analyst. Also, factoring the regional characteristics of the airports would find analysts taking more differentiated positions. The paper is merely exploratory and aims to serves as a catalyst of discussion for a range of possibilities of analysis. Holding quality management forums for the representative airports can further enhance the survey results and enrich the analysis.

CONCLUSIONS AND RECOMMENDATIONS

The survey results provide a snapshot of the degree to which performance measurement is prevalent in the Indian aviation industry and its compliance with Best Practices. It primarily measures and compares the performance levels of five international airports in India while addressing several areas of activity such as operations, economics, customer service, environmental issues and safety and security. Thus, the study has laid equal emphasis on the terminal as well as airside operations, which are found to be contingent on each other and affecting airport utilisation and productivity. However, it does not integrate the two, as the strategies needed to enhance their efficiencies are completely different. It uses the tool of benchmarking, currently the most critical, easy, and economical tool of performance management, to bring about core development in the airport productivity. In short, it presents Indian managers with a methodology to identify aspects of airports that are perceived most relevant for exemplary performance levels by expert professionals.

The characteristics of airport performance are predominantly based on a number of actors: airport operators, airline carriers, airport passengers and airport retailers. The paper has limited its investigation of performance levels to the perception of operators. The next step would be to conduct a research exploring the viewpoint of passengers, carriers and retailers in the Indian context. Similarly, the airports researched in the survey were procured through public-private partnerships and were privately operated. Thus, as a way forward the research conducted above should be extended to include publicly managed airport as well. The body of knowledge developed through such robust exchange of information between the airports and rigorous research would help accelerate the progress of Indian airports.

REFERENCES

Adler, N., T.H. Oum, and C. Yu. (2009), A response to 'Understanding the complexities and challenges of airport performance benchmarking'. *Journal of Airport Management,* Vol. 3 (2), pp. 159-163.

Centre for Aviation. (July 2015), *India Aviation Outlook: Traffic up, losses down but operating environment remains challenging.* http://centreforaviation.com/analysis/india-aviation-outlook-traffic-up-losses-down-but-operating-environment-remains-challenging-228991. Accessed 18 July 2015.

Chen H. (2002), Benchmarking and quality improvement; A quality benchmarking deployment approach. *International Journal of Quality & Reliability Management,* Vol.19 (6), pp.757-773.

Cho, A. and S. Lewis. (2011), Eastern Expansion. *Aviation week and Space Technology*, Vol. 173 (16), pp. 48.

Cox, A. and I. Thompson. (1998), On the appropriateness of benchmarking. *Journal of General Management,* Vol. 23, pg. 1–20.

Enoma, A. and S. Allen. (2007), Developing key performance indicators for airport safety and security. *Facilities*, Vol. 25(7), pp. 296-315.

Fasone, V., P. Maggiore, and R. Scuderi. (2014), Airport ownership and financial performance: Evidence from Italy. *Journal of Air Transport Management*, 2014, Vol. 40, pp. 163-168.

Gillen, D.W and A. Lall. (1997), Developing measures of airport productivity and performance: an application of data envelopment analysis. *Transportation Research Part E*, Vol. 33 (4), pp. 261-273.

Granberg T.A. and A. O. Munoz. (2013), *Developing key performance indicators for airports*. ENRI Int. Workshop on ATM/CNS. Tokyo, Japan.

Holloway, J.A., C.M. Hinton, G.A.J. Francis, and D. Mayle. (1999), *Identifying best practice in benchmarking*, CIMA Research Monograph, CIMA, London.

Hooper, P. (2002), Privatization of airports in Asia. *Journal of Air Transport Management*, Vol.8 (5), pp.289-300.

Jim, H. K. and Z.Y. Chang. (1998), An airport passenger terminal simulator: A planning and design tool. *Simulation Practice and Theory*, Vol. 6, 387-396.

LaMarca N. (2011), *The Likert Scale: Advantages and Disadvantages.* http://psyc450.wordpress.com/2011/12/05/the-likert-scale-advantages-and-disadvantages. Accessed July 5, 2014.

Lemer, A. (1992), Measuring Performance of Airport Passenger Terminals. *Transportation Research*, Vol. 26 (1), pp. 37-45.

Manataki, I. E. and K.G. Zografos. (2010), Assessing airport terminal performance using a system dynamics model. *Journal of Air transport Management*, Vol. 16, pp. 86-93

Ohri, M. (2012), Discussion Paper: Airport Privatization in India, *Networks and Spatial Economics*, Vol.12 (2), pp. 279-297.

OPAL Consortium. (2003), *Inventory of airport performance models and design of model base*, Technical Report (public version), Brussels, Belgium.

Oum, T. H. and C. Yu. (2004), Measuring airports' operating efficiency: a summary of the 2003 ATRS global airport benchmarking report. *Transportation Research Part E*, Vol. 40, pp. 515-532

Patel U. R., and S. Bhattacharya. (2010), Infrastructure in India: The Economics of Transition from public to private provision. *Journal of Comparative Economics*, Vol. 38, 2010, pp. 52-70.

Raghunath S. (2014) The Development of Mumbai's Second Airport: The 'Deal of the Year' or 'Irrational Exuberance'. *Facing the Future: Building a More Resilient Airport Business Model*

http://www.leighfisher.co.uk/sites/default/files/free_files/compendium_-_facing_the_future_-_winter_2014-2015.pdf. Accessed July 20, 2015.

Raguraman K. Troubled Passage to India. (1998), *Tourism Management*, Vol. 19 (6), pp. 533-543.

Reinhold, A., H.M. Niemeier, V. Kamp, and J. Muller. (2010), An evaluation of yardstick regulation for European airports, *Journal Of Air Transport Management*, Vol. 16(2), pp. 74-80.

Tsekeris, T. (2011), Greek airports: Efficiency measurement and analysis of determinants. Journal Of Air Transport Management, Vol. 17(2), pp. 140-142.